AN HISTORICAL ANALYSIS OF THE DEVELOPMENT OF RED HORSE

THESIS

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AFIT/GEM/LSR/87S-26

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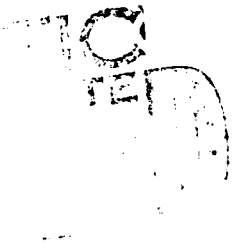

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AN HISTORICAL ANALYSIS OF THE DEVELOPMENT OF RED HORSE

THESIS

Presented to the Faculty of the
School of Systems and Logistics
of the Air Force Institute of Technology
Air University
In Partial Fulfillment of the
Requirements for the Degree of
Master of Science in Engineering Management

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Preface

The purpose of this research was to analyze the issues which contributed to the decision to create RED HORSE. Alone, this study would be an interesting testimony to the perserverance of earlier Air Force Civil Engineering leaders, in the quest for 'getting the job done' under difficult conditions. Such responses from other organizations and commanders as 'I need this done ASAP, but don't let the other projects slip,' or 'sorry, we're out of the building materiel you requested, they won't be in 'til next month,' or 'why does it take so long for CE to do anything?' seem to be normal. My research shows that for the RED HORSE in Vietnam, at least, the challenge was met, the obstacles were hurdled, RED HORSE received each tasking with a resounding 'Can Do-Will Do.'

Couple this study with similar studies on Prime BEEF, Fire Fighting and Crash Rescue, Threat Impact on CE Operations, and so on, as HQ USAF/LEEX intends to do, and we are well on our way towards establishing an Air Force manual on Engineering and Services wartime doctrine, which was the intended end product of my research.

My research would not have been nearly so complete but for the support of several others. Dr. Freda Stohrer, my thesis advisor, continually provided encouragement and advice, kept me focused on the meat of the matter when I strayed onto the trails of insignificance, and provided a model of professionalism. Thank you. I also wish to thank

Major Hal Rumsey, my faculty curriculum advisor and thesis reader. He provided the engineering logic to help bond the purpose to my research and helped identify sources which I might otherwise have missed. Finally, I wish to thank my wife, Lisa, for her constant support from the home front--emotionally, physically, and spiritually. When necessary, she corralled the children, gave up many evening hours, dinner dates, and weekends; for that, it is as much her effort as it is mine.

Jon A. Wheeler

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Abstract

The purpose of this study was to analyze the historical events leading up to the creation of RED HORSE (Rapid Engineer Deployable, Heavy Operation Repair Squadron, Engineering). The study had two objectives: (1) Capture the decision making rationale for the creation of RED HORSE by summarizing Air Force Civil Engineering's historical situations, problems, and solutions, in past wars, since WWII. (2) Provide a historical perspective of the decision making processes within the Air Force Civil Engineering community since its existence, with a focus on RED HORSE.

The three historical periods which bear most heavily on RED HORSE are the period following WWII in which the joint Army and Air Force agreements of the National Security Act of 1947 divided the responsibilities for contract construction and troop labor construction between the Army and the Air Force, the Korean War, during which Army SCARWAF units supplied the Air Force with construction support, and the Vietnam War, which precipitated the creation of RED HORSE due to the lack of construction support from the Army and Navy.

The research methodology included (1) personal correspondence conducted with two AFCE leaders who were heavily involved in the creation of RED HORSE and were former commanders of RED HORSE during their Air Force careers, (2)

review of such journals as The Air Force Engineering and Services Quarterly, Air University Review, The Civil Engineer, and The Military Engineer, and various theses and papers written at the Air Force Institute of Technology, Air War College, and Air Command and Staff College, and (3) research at the Air Force Historical Research Center, Maxwell AFB AL.

The study concludes that due to the lack of sufficient support from sister services during past conflicts, after WWII, the Air Force sought for, and was granted, organic troop construction and contract construction management capability in the form of RED HORSE.

AN HISTORICAL ANALYSIS OF THE DEVELOPMENT OF RED HORSE

I. Introduction

Justification for Research

Air Force Manual (AFM) 1-1 states the Air Force's basic aerospace doctrine. The preface quotes General Curtis LeMay, who says

> At the heart of warfare lies doctrine. It represents the central beliefs for waging war in order to achieve victory. Doctrine is of the mind, a network of faith and knowledge reinforced by experience which lays the pattern for the utilization of men, equipment and tactics. It is the building material for strategy. It is fundamental to sound judgement [9:ii].

Doctrine is further defined in Joint Chiefs of Staff Publication 1 (JCS Pub 1) as

> Fundamental principles by which military forces or elements thereof guide their actions in support of national objectives. It is authoritative but requires judgement in application [6:118].

In plain language, then, doctrine is 'what is officially believed and taught about the best way to conduct military affairs' (29). In Air Force Civil Engineering, not only does Engineering and Services doctrine serve as our warfighting foundation, it is the 'necessary departure point for developing, equipping, sustaining, and employing Civi' Engineering [and Services] forces (29).

Engineering and Services doctrine assimilates such concepts as airbase operability, organization, people,

training, engineering and services logistics, and wartime employment in such a way as to provide the best guidance for sustaining our warfighting forces (29).

Air Force doctrine, on the whole, has its foundation in historical data and experience. When researchers look at the history of USAF wartime experiences, they must analyze that information to find patterns of success (or failure) for certain methods or practices, as these methods or practices relate to sets of circumstances. When those sets of circumstances are grouped together by similar characteristics, the patterns point to particular problems or useful behaviors. This information can then be consolidated to provide guidelines for fellow professionals, and may save not only money and materiel, but even lives. When officially accepted, taught, and institutionalized, this type of information becomes doctrine (30:all).

Problem Statement

There is a general lack of consolidated information about Air Force Civil Engineering (AFCE) warfighting/contingency capability, and as a result, we have no formal Air Force Manual on Engineering and Services doctrine. Hence, AFCE leadership, because of this vacuum, reinvented the wheel every time our nation went to war, especially in the post-Second World War (WWII) era. The absence of this information base also reduces the cohesiveness which a compendium of AFCE warfighting experience would normally provide. The value of such a collection during wartime would prove

priceless because AFCE leadership could turn to such a guidebook in times of war and contingencies to help in decision making (35:2-4).

Not until very recently have Air Force researchers begun to compile a history and bibliography to help capture on paper the combat experience of our AFCE veterans. However, this data base only begins to lift this information blackout. Follow-on researchers must broaden that base by studying more specific warfighting elements of AFCE.

RED HORSE (Rapid Engineer Deployable, Heavy Operation Repair Squadron, Engineering) is the AFCE unit whose history is analyzed here. RED HORSE was established to conduct wartime and contingency airbase construction, maintenance, and heavy repair for air base facilities. The RED HORSE organization is more fully described in Chapter 2.

Statement of Purpose and Objective

In conducting this research, I have compiled and analyzed the history of AFCE warfighting experience during the conception and early development of RED HORSE, from 1947 through 1970, the years surrounding the establishment of the United States Air Force (USAF), the Korean War, and the Vietnam War (until the beginning of President Richard Nixon's Vietnamization Program) to draw some conclusions about the usefulness of the RED HORSE organization for future conflicts. This research will also become part of an accumulation of AFCE history and experience, along with research in such areas as threat analysis and the impact of

technology on AFCE. Finally, this research may provide part of the historical basis for an Air Force manual on Engineering and Services wartime doctrine.

Specific questions I have tried to answer are:

1. What was the major AFCE issue during the Vietnam era that influenced the decision to organize RED HORSE?

2. How did the issue differ from the issue of previous conflicts?

3. Is the RED HORSE organization still a viable AFCE asset for future conflicts?

Scope and Limitations

In this thesis, I have collected and analyzed experiences of AFCE leaders in the field during the Korean and Vietnam Wars, as they related to RED HORSE. My principle concerns were the conduct of the AFCE mission in Korea and Southeast Asia in the 1950's and 1960's and AFCE's response to those problems, in terms of organizational change.

Unfortunately, much of the general correspondence between and within major organization levels and other historical records have been lost to researchers as a result of a combination of factors--a lack of storage space, unit historians not realizing the historical value of what might seem to be a common document or correspondence, and the tremendous cost associated with collection, cataloging, and storage of historical documentation. 'ypically, during my research at the Air Force Historical Research Center (AFHRC) Maxwell AFB, Alabama, certain historical documents were discovered only because they were included as part of the

general correspondence section from a major organizational level or were included in a prominent person's collection of papers. For example, the 10 May 1965 memorandum from Secretary of Defense McNamara to Secretary of the Air Force Brown and Secretary Brown's reply concerning the Air Force's construction capability were not at the AFHRC, but was provided to me courtesy of Col (Ret) Harry Glaze.

Methodology

My first step was to review the journal literature for the general background of the RED HORSE organization and an initial list of primary documents. The literature search also provided information about events before the Vietnam War which influenced the decision to create RED HORSE, i.e. the National Security Act and the Korean War.

Such journals as The Air Force Engineering and Services Quarterly, Air University Review, The Civil Engineer, and The Military Engineer were thoroughly reviewed because they are primarily concerned with AFCE in general, and often featured articles about AFCE units in Southeast Asia (SEA) during the Vietnam War. Other secondary documents reviewed were past theses and papers written at the Air Force Institute of Technology, Air War College, and Air Command and Staff College.

The Air Force Historical Research Center was perhaps the richest source of information pertaining to the research questions listed earlier. Many primary source documents

were found which dealt directly with the AFCE problems of the Korean and Vietnam Wars.

Finally, I conducted personal correspondence with two prominent AFCE leaders, Brigadier General (Ret) Archie Mays and Colonel Harry Glaze. General Mays, in 1965, was the Tactical Air Command Civil Engineer and later commanded the 1st Civil Engineering Group in South Vietnam, which was responsible for operational control of all RED HORSE squadrons in Vietnam. As the 1st CEG commander, he was also responsible for managing the Operation Turnkey base construction at Tuy Hoa AB, as well as being the 2nd Air Division staff Civil Engineer, and the Air Force Regional Civil Engineer in Southeast Asia. Col Glaze was a past RED HORSE squadron commander and former Deputy Chief of Staff for Civil Engineering in Pacific Air Force (PACAF).

To each leader, I sent a personal letter which contained introductory information about me and my research, my research questions and objectives, and my request for any other information which they felt would be significant. Each letter closed with a request for permission to telephone them in the event I had any other questions.

Possible weaknesses of personal interviews and correspondence are personal bias, selective memory, inconsistency, and disagreement. However, because their responses to my requests correlated so well to the information I had uncovered at the AFHRC, correspondence with other AFCE leaders would probably only duplicate their responses. Historical

records, when compared to Gen Mays' and Col Glaze's correspondence, confirmed their answers.

Overview

Chapter 2 establishes the need for contingency engineering in the USAF. It outlines the general AFCE wartime missions and roles, and describes the RED HORSE organization, its unique characteristics as an AFCE unit, and finally, its capabilities and mission.

Chapter 3 details the AFCE-related data from the birth of the Air Force in 1947 with the National Security Act and inter-service agreements. This chapter also describes typical AFCE problems faced during the Korean War with respect to attributed to logistics, terrain, and organizational responsibilities.

The unique problems encountered by AFCE during the Vietnam War are presented in Chapter 4. This chapter describes the basic issues of the Vietnam War which precipitated the creation of RED HORSE, and highlights some of RED HORSE's accomplishments during the Vietnam War to the present.

Finally, Chapter 5 summarizes the answers to the research questions and outlines conclusions and recommendations for further research.

II. Background

Air Force Civil Engineering

In order to appreciate the decisions and actions which led to the creation of Rapid Engineer Deployable, Heavy Operation Repair Squadron, Engineering (RED HORSE), one must understand the peculiar role of Air Force Civil Engineering (AFCE) as it relates to Air Force warfighting as a whole, as well as to the RED HORSE organization itself.

The Air Force's general mission, stated in the Basic Aerospace Doctrine manual, is shown in Table 1.

Table 1
Air Force Mission (9:3-2)

Strategic Aerospace Offense
Strategic Aerospace Defense
Counter Air Operations
Air Interdiction
Close Air Support
Special Operations
Airlift
Aerospace Surveillance and Reconnaissance
Aerospace Maritime Operations

AFCE's mission is to 'provide and sustain essential facilities, utilities and services whenever and wherever required to support [USAF] CONUS sustaining and theater operations.' The varied and complex mission incorporates not only wartime repair and construction, but also the normal peacetime requirements of base operations and maintenance during a wartime environment (23:A-2). Concisely

stated, AFCE's mission is to "Provide the necessary assets and skilled personnel to prepare and sustain global installations as stationary platforms for the projection of aerospace power in peace and war" (12:6).

This mission is broken down into three functional areas roughly corresponding to the three periods of response to enemy attack: Force Beddown activities normally occur prior to an enemy attack. Airbase Survivability actions attempt to minimize direct damage during an attack. Airbase Recovery actions, immediately following attack, enable our forces to become operational again.

Done before an anticipated enemy action or commencement of hostilities, Force Beddown is accomplished by "providing minimum expedient* facilities necessary for deployed units to become operationally ready for air combat operations" (23:A-2). AFCE must provide aircraft facilities--those facilities used for aircraft operations and parking, such as runways and taxiways, arresting barriers, navigational aids, and parking ramps; aircraft maintenance and turnaround facilities--those facilities used for munitions and fuel storage, aircraft maintenance, and aircraft power generation; and aircraft support facilities--areas such as person

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*Expedient facility construction standards are those which include some type of utility supply and hardbacking of tents. Expeditionary facility construction standards include wood and/or masonry construction. Austere facility construction standards only allow for primitive tent erection and sanitary facilities, such as trench or pit latrines and pit disposal for food waste and garbage.

nel housing and housing support, sanitation, and base power generation and distribution facilities.

Airbase Survivability is accomplished by 'providing the design, construction, and reconfiguration of the airbase infrastructure in order to reduce the magnitude of the enemy attack, minimize the impact on sortie generation critical activities' (23:A-3). AFCE thus constructs facilities (bunkers and other fighting emplacements) for perimeter and point air defense support, hardens priority facilities, provides splinter protection from fragmentation, accomplishes base Camouflage, Concealment, and Deception (CCD) activities, disperses essential equipment and materiel, and provides a redundancy in such areas as alternate launch and recovery surfaces. Even though airbase survivability actions are accomplished prior to an attack, emphasis is placed on intended performance during attack.

Airbase Recovery describes both AFCE actions following an enemy attack as well as the desired end-result of a base's rapidly renewed operations. All actions taken during force beddown and base survivability phases of force employment are geared toward quick, effective base recovery following enemy attack. If a friendly force's personnel, materiel, and equipment are dispersed and camouflaged properly, chances for survival and recovery are high. Similarly, if facilities are properly hardened, and if proper CCD techniques, such as moulage craters and decoys, are done, the airbase may suffer minimal damage (from

conventional attack) and will be able to recover much more quickly.

The after-attack recovery actions of AFCE include damage assessment, repair of launch and recovery surfaces such as runways and taxiways, repair and restoration of utilities, and repair of essential facilities, such as command and communications buildings and medical facilities. These actions are expected to be done, in most cases, in chemically or biologically contaminated environments, with unexploded ordinance and/or area denial munitions present.

AFCE, in wartime, must construct the right facilities to support air combat operations, sometimes prior to arrival of operational units in-theater, harden essential facilities (with sandbags or earth berms) and disperse essential equipment and personnel for enhanced survivability, and finally, repair essential facilities as soon after attack as possible so the base may quickly resume air combat operations (23:all).

All three actions must be done in a climate that is very demanding, not only on the labor pool actually doing the work, but also on the decision makers. The environment is super-dynamic; the priorities change rapidly because of new information from intelligence sources, higher level commanders, damage assessment personnel, and enemy actions.

RED HORSE

One of the two AFCE warfighting units is RED HORSE (Rapid Engineer Deployable, Heavy Operation Repair Squadron,

Engineer). Its mission and special training make it the only AFCE combat unit, unlike the combat support or combat service support units (10:11). Like other combat units, RED HORSE is trained and equipped for possible direct confrontation with the enemy. AFCE combat support units (aircraft maintenance, host base engineering, and security police) in contrast, directly support combat units. A third type of unit, the combat service support unit, functions in the rear area, providing administration, transportation, medical, personnel, and fuel storage support.

A typical RED HORSE squadron has 17 officers and 387 enlisted personnel (all male), trained in all civil engineering skills. RED HORSE uses carpenters, electricians, plumbers, general heavy equipment operators, and engineering draftsmen. Non-CE skills include vehicle maintenance specialists, medics and physicians, disaster preparedness specialists, and food service personnel (10:A-1).

The unit is trained to be self-sustaining during deployment. Training, in addition to that received by other AFCE units, includes training in demolition, concrete production and paving, disaster preparedness mobility, Harvest Bare/Harvest Eagle kit* erection, materials testing, expeditionary aircraft barrier installation, revetment construction, water well drilling, special weapons, and special purpose heavy construction equipment.

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*An AF base facilities package containing pre-manufactured, lightweight, air-transportable buildings.

The RED HORSE squadron is supplied and equipped to meet this self-sustaining requirement. It is supplied so that it can operate independent of base support for an indefinite period of time, with resupply of consumables, such as rations, fuel, ammunition, and personnel replacements. Equipment includes heavy construction equipment, such as bulldozers, dumptrucks, and scrappers normally seen with heavy construction companies, but also includes the quarry operations equipment and concrete batch plants required to keep the squadron self-sustaining in the field.

A typical RED HORSE squadron comprises three echelons which can be deployed separately for shorter periods of time, and which can have different capabilities and missions. The RH-1 echelon is an advance team of 16 men responsible for preparing advanced airfield surveys, beddown plans, site layouts, and for determining material and facility requirements.

The RH-2 echelon is a 93-man team responsible for Rapid Runway Repair (RRR)*, and bomb damage repair (BDR)**,

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*Rapid Runway Repair, RRR, is a term used to describe the actions used to repair runway, taxiway, and parking ramp surfaces to restore combat aircraft operations as quickly as possible. The object is to clear debris, fill bomb craters, and repair other damage to these surfaces to provide a minimum surface 50 feet x 5000 feet, as well as aircraft access from their parking areas.

**Bomb damage repair, BDR, simply means restoring essential command, control, and communications facilities to working condition, in the shortest time possible, to allow rapid resumption of combat operations. Only those actions necessary to provide functional use of the facility are performed at this time; cosmetic, and more extensive repairs are performed when the situation permits.

preparatory site clearing, heavy equipment operations, fill and earth moving, Harvest Bare/ Harvest Eagle kit erection, explosive demolitions, well drilling, aircraft arresting barrier installation, and utility installation.

The RH-3 echelon is a 295-man team which delivers the base support for the squadron. It is responsible for heavy repair of facilities, Harvest Bare/Harvest Eagle kit erection, mineral production plant (rock crusher and quarry) operations, RRR, and fully independent operations, with resupply of consumables.

Currently there are four regular active duty RED HORSE units, one Air Force Reserve (AFRES) unit, and one Air National Guard (ANG) unit, shown in Table 2.

TABLE 2
Currently Activated RED HORSE Units (25)

Unit Designation	Location	Command
554(HR)	Osan AB, South Korea	PACAF
819th(HR)	Weathersfield AB, UK	USAFE
820th(HR)	Nellis AFB, Nevada	TAC
823rd(HR)	Hurlburt AFB, Florida	TAC
307th(HR)	Kelly AFB, Texas	AFRES
200th(HR)	Union Town Gap, Penn.	ANG

Peacetime training in RED HORSE units is designed to maximize skills which will be required in a wartime environment. Various Air Force bases which desire the use of RED HORSE manpower to complete a construction project route their requests to a central RED HORSE point of contact within the major commands' directorate of Civil Engineering

operations, or MAJCOM/DEO. Here the projects are reviewed by the DEO staff for applicability (Is the project scope and task appropriate for training?), feasibility (Does RED HORSE have the expertise required?), and prioritization (Is there appropriate balance of mission support, training, and command interest?). If the MAJCOM/DEO determines that the project is appropriate, the major command then sends a prioritized, updated project list to its respective RED HORSE unit, who plans (and in some cases designs) the projects, requisition materiel, schedule personnel, and insures equipment availability (10:Ch3).

RED HORSE units are centrally controlled in peacetime just as in wartime, that is, through the parent major command Civil Engineer in peacetime, or the USAF component of the theater command in wartime (10:8). RED HORSE units in a given theater of operations, then, are not under the control of the host base Civil Engineer, or host wing commander where they happen to be stationed, but under the control of a centralized commander, such as a numbered air division Civil Engineer, or the Air Force component Civil Engineer within a joint commmand (32:all).

The effect of this control mechanism is that RED HORSE squadron, or detachment, commanders do not 'serve two masters' in peacetime or in wartime. This lack of confusion, resource allocation (at the local level), and the sense of a oneness of purpose result from RED HORSE design

and blend to maximize the synergistic effect of a RED HORSE squadron's teamwork.

III. Post-WWII and Korea

Separation of Service Roles and Responsibilities

The National Security Act of 1947 was passed by Congress at the end of the Second World War (WWII). This Act, and its subsequent revisions, amendments, and agreements, established, among other things, a new, separate military service--the United States Air Force.

Because the Air Force was created out of the Army, certain functions and responsibilities were totally separated from the Army and assigned uniquely to the Air Force. Other functions, such as construction engineering, area security around airbases, and long-distance ground transportation were retained by the Army with the responsibility to support the Air Force when required. The Army aviation engineering units which were organized, trained, and supplied by the Army, and placed under the operational control of the Air Force were called SCARWAF (Special Category Army units With the Air Force). The delegation of contract construction and troop construction responsibilities to the Army left the Air Force without organic (in-house) heavy repair or construction capability.

In the 1947 joint service agreements between the USAF and the U.S. Army, service groups which were not organic to an Air Force unit, and which performed a service common to both Services were to remain Army assets; Army SCARWAF engineer battalions were included in this category, but were

to be attached to the Air Force for duty (2:51,76;3:89). Both services were also given the responsibility to develop and defend their own construction budgets, but the Army was to be the contract construction agent for the Air Force (20:1). The responsibility for budget estimates and defense, however, did not take effect until fiscal year 1950 (22:2). The Army and Air Force were also given the responsibility for determining their own repair requirements and budgeting beginning about fiscal year 1950 (22:2).

SCARWAF

Because the Army engineer battalions were considered to work for the common benefit of both Services, the Army was given the responsibility for construction using troop labor, called troop construction, for both services, even to the extent of ". . . rehabilitation and repair of Air Force bases and facilities . . ." and ". . . construction or improvement of airfields . . ."(22:1). The Air Force was charged with base maintenance, including immediate damage recovery, using Air Force Civil Engineering resources (21:2,22:1).

These agreements between the Army and Air Force gave the Air Force responsibility for air base maintenance, repair, and recovery after attack; the Army retained the troop construction and contract construction responsibilities for both services. Could the Army train their SCARWAF units to accomplish the Air Force's unique airfield requirements? Could they, or would they, keep a steady supply of

adequately trained, experienced reinforcements to the theater of operations? The wisdom of this arrangement was to be severely tested during the Korean War.

Construction Problems in Korea

The air war in Korea was beset with a number of problems: the length of the supply lines to Korea, the Korean terrain, the engineering and technical problems of base construction brought about by new technological advances in aircraft, and the DoD organizational changes since WWII (1:86).

The length of the supply lines to Korea stretched over 8000 miles from the United States. Because the geographical position of Korea left it at the tail end of the logistical pipeline, supplies and replacements were slow in coming and few in number when they did arrive. The heavy construction equipment was WWII vintage and required continual maintenance to keep it on line. Some pieces were actually salvaged from some Pacific Islands where they had been abandoned during WWII. During railroad shipment within Korea, many pieces of equipment were so badly cannibalized by Koreans that they could only be scrapped for parts upon reaching final destination (1:86).

The Korean terrain presented a great challenge to the engineer aviation unit in terms of airfield construction. The engineer had to contend with rugged, mountainous terrain, on the one hand, or the water-logged rice land, on the other.

The engineering and technical problems, created by both Korean terrain and the transition from propeller-driven to jet engine aircraft required more significant changes, this time in airfield design, especially in terms of length, pavement thichness, and type. Airfields with lengths of 4000 to 6000 feet at the beginning of the Korean War required extensions to 9000 feet by the second year of the war.

Another engineering problem faced by SCARWAF units due to changes in aircraft types was that the airfield pavements were deteriorating from the use of heavy aircraft. The pavement thichness was a function of the weight-bearing capacity of the supporting soil. The California Bearing Ratio (CBR) is a measurement of a soil's weight-bearing capacity. Proper airfield pavement support of a 6-inch thick base course (gravel) layer normally requires a CBR of 30. The CBR of the Korean farmland (water-logged rice land) averaged around 3 to 5, and required roughly five times that thickness of base course (about 30 inches) to achieve the same support; this gravel was moved by hand labor and hand trucks (1:86).

Finnally, most of the existing airfields in South Korea were paved with gravel. This caused significant problems with jet aircraft because the rocks were often drawn into the jet intakes, causing serious damage to the engines. Some existing airfields were paved with gravel and covered with perforated metal sheets, called Pierced Steel Planking,

or PSP. PSP proved an improvement over plain gravel paving during the rainy seasons because it kept the planes from bogging down in the mud, but still provided no protection from gravel damage to the aircraft engines. In many cases, the aviation engineers had to pave over the existing airfields with asphalt or concrete to provide an appropriate surface (1:87). The construction effort, then, required massive support from the engineer aviation units and the indigenous civilian labor force used at these airfields(1:91).

A second kind of problem arose from the division of construction responsibilities assigned in the National Security Act of 1947 and the Joint Army and Air Force Agreements. During WWII, few Air Corps commanders understood the tremendous effort required to make an airfield operable. They simply moved into operating bases which had already been prepared by the Army's Corps of Engineers. In Korea, the USAF had to operate from austere airfields until the engineer aviation battalions could complete repair and construction requirements and move on to adding improvements (1:92).

Because of the Army's commitment to construction support for USAF operations in Korea, the U.S. Army manned, trained, and equipped aviation engineer battalions, called SCARWAF, and gave their operational control to the Air Force. Who submitted the Air Force's requirements to the Army to properly train the SCARWAF troops? A 1953 Air Force

historian quoted one of the SCARWAF unit commanders as saying that the chief deficiency of the SCARWAF units was poor replacement flow rates and poor training of both the initially deployed personnel or of replacement personnel. The one year tour of duty in Korea required a steady flow of replacements, which did not occur. As a result, the SCARWAF units were 65% to 75% of authorized officer strength and as low as 36% of authorized noncommissioned officer strength; a majority of the replacements were privates and lieutenants with hardly any practical experience and minimal training (18:179-180).

Had the SCARWAF personnel been Air Force assets, these management problems, as well as those of equipment authorization, safety training, and fire protection would have been easier to solve. The Department of the Army Tables of Organization (TO) made no provisions for these items, and the TO's of a numbered Air Force did not provide for the inspection of a SCARWAF unit as large as a normal size engineer aviation brigade.

> Often times the SCARWAF units were separated into camps of 1000 to 2500 personnel which needed fire protection and security that had to be provided from primary mission personnel [34:118].

Simply stated, one of the chief detractions from USAF's mission in the Korean War was the inability of the Army engineers to provide air installation construction and maintenance. A 1953 Air Force historical report points out the Army engineers' weakness in Air Force support:

> Of all the requisites to the conduct of tactical air operations during the first two years of the Korean war, the construction and maintenance of air facilities had been the most deficient. . . . The deficiency of air facilities in Korea sprang directly from a weakness of the engineer aviation capability, a matter over which USAF had slight control since such units were SCARWAF (special category Army personnel with the Air Force) and trained, manned, and equipped by the Department of the Army [18:172].

Indeed, all these problems could have been significantly reduced had USAF had organic aviation engineers with which to coordinate efforts and logistics [18:172].

The problems encountered by AFCE during the Korean War, then, were caused by Army construction support which was deficient in quality of SCARWAF personnel experience, equipment availability, and personnel training. The units were chronically undermanned, the equipment was salvaged and for the most part unuseable, and the personnel were not trained sufficiently to support USAF requirements. USAF needed an organic, construction-capable unit which could be manned, trained, and equipped to support the Air Force mission in Korea. AFCE problems in Korea, then, were <u>quality of support</u>, rather than timeliness of support which will surface in the Vietnam War.

One of the best lessons learned from the Korean experience was stated as a recommendation by USAF Col R. I. Millberry in his article in 1953:

> The Air Force has a vital need for the Engineer Aviation Forces. They are not combat engineers and not construction engineers, but specialists in the art of building airfields. . . a critical support element. . . rich in equipment which, if operational, provides a tremendous construction poten-

> tial. . . . They need to be integrated into the Air Force. . . . They should be building all the peacetime construction of the Air Force as training for wartime construction [34:119].

These lessons were seemingly unheeded, because as the U.S. prepared and entered into another war, this time in the Republic of Vietnam, USAF still had no organic construction engineers, in keeping with the troop construction agreements of the 1947 National Security Act, some 18 years previous (37:all).

IV. Vietnam to the Future

Gulf of Tonkin Incident

On 2 August 1964, the destroyer USS Maddox was on a mission both for intelligence gathering (the unofficial reason) and to confirm the United States' right to international waters off the North Vietnam coast (the official reason). The Maddox reported being under attack by three North Vietnamese torpedo boats. F-8 fighter aircraft from the aircraft carrier USS Ticonderoga assisted in the Maddox's defense and successfully repelled the attack. President Johnson declined to retaliate because he felt the attack was 'an isolated incident caused by an impulsive [North Vietnamese] PT-boat commander (28:33).

On the night of 4 August 1964, the destroyers USS Maddox and USS Turner Joy were on a similar mission in the same area. Radio transmissions from the Maddox again reported North Vietnamese torpedo boat attacks on the destroyers. However, Ticonderoga aircraft responding to the call could not confirm the attacks. Indeed, later entries into ships' logs seemed to contradict earlier entries of the 4th, saying there had been no attack. These events became the Gulf of Tonkin incident.

The U.S. Congressional reaction to the incident produced the Tonkin Resolution which gave the President authority to commit U.S. combat troops to South Vietnam in sup-

port of the U.S. advisory troops already there assisting the government of South Vietnam (28:32-35).

U.S. Forces Escalation

Until 1964, U.S. military assistance to the South Vietnamese government was only in the form of military and technical advisors and facility support through the MAP (Military Assistance Program) and Aid In Kind program (13:2).

As a response to scattered communist-backed attacks in late 1964 and early 1965, President Johnson ordered the 9th Marine Expeditionary Force* ashore at Da Nang in March, 1965. The first U.S. ground combat troops had landed in the Republic of South Vietnam (RVN). U.S. forces were in RVN not only to help the South Vietnamese defeat the Communist insurgency, but also to develop a counter-insurgency capability within the U.S. military.

> . . . the President [J.F.Kennedy] was profoundly interested in building a counter insurgency capability within the U.S. armed forces. He repeatedly urged that the JCS [Joint Chiefs of Staff] utilize the situation in South Vietnam to study and test techniques and equipment in a guerilla environment [36:11].

For the Air Force, the escalation in SEA included increasing numbers and types of aircraft: B-26 and T-28 aircraft already in-theater, as well as the newer F-100, F-102, F105, B-57, C-124, C130, and KC-135 aircraft (13:12).

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* Later renamed the 3rd Marine Amphibious Force (MAB) 'because of an alleged imperialistic inference in the original designation' [36:25n].

These additional aircraft had a profound impact on the AFCE mission in SEA, similar to the effect of the new jet aircraft in the Korean War. In Vietnam, as in Korea, the problem of finding airfield locations was, to a large extent, non-existent because airfields had already been constructed by the French and Japanese during their earlier occupations. The main requirements on those existing airfields were to rehabilitate, add to, and repair existing facilities (40:68). Existing airfields at Bien Hoa, Hue, Nha Trang, Pleiku, Tan San Nhut, Da Nang, and Vung Tau required lengthening and strengthening of the airfield surfaces (runway, taxiway, and ramps). The navigational aids, aircraft barrier arresting systems, and revetments also needed improving, if not constructing anew. Other facilities for troop housing, aircraft maintenance, and other support were almost non-existent. The problem of facility construction was compounded in 1964 because of the U.S. Forces' buildup in SEA. A 1965 historical brochure detailing the AFCE mission and performance in SEA states that "... the resources of all U. S. [construction] agencies were severely strained to provide more facilities in a short period of time. Delays in design and construction, as well as land use approval had a serious effect on the mission of all U.S. Forces" (13:3).

The number of aircraft and the size of the supporting force structure were increased so much in such a short period of time that existing aircraft parking space rapidly

became overcrowded. Other airbases had to be constructed to relieve the overcrowding, which led to extreme vulnerability, such as that which precipitated the Bien Hoa disaster, when a series of explosions destroyed several aircraft parked close together. Cam Ranh Bay, Phan Rang, Tuy Hoa, and Base X were examples of airbases built to accommodate the enormous USAF buildup in 1965-1966 (13:63).

Recognition of USAF Construction Requirmements

On 10 May, 1965, Secretary of Defense Robert S. McNamara asked Secretary of the Air Force Harold Brown if the Air Force could establish an operating airfield in enemy-controlled territory within 28 days as the U.S. Marines would soon do at Chou Lai (37:all).

Secretary Brown replied that the Air Force relied on the Army for this capability but that other means for an Air Force rapid response were under study. He then suggested, based on current studies, that the Air Force did need an organic (in-house) heavy repair capability, and that it should be pre-positioned with equipment and supplies for rapid response to heavy bomb damage, disasters, and major repairs in the absence of civilian construction contractors, a Navy SeaBee battalion, or Army engineer support capability. He then stated that the Air Force planned to activate two such units from existing Air Force resources if approved (7:7). Secretary McNamara approved the heavy repair concept in the early Fall of 1964, and two RED HORSE squadrons

were activated in October 1965; they were trained, equipped, and deployed to Vietnam in February 1966.

Construction Support in Vietnam

In the Korean War, AFCE faced a deficiency in Army construction support in terms of quality. In the Vietnam War, on the other hand, AFCE faced a deficiency in overall construction support in terms of timeliness and cost; this time from both the Army and Navy.

What difference existed between the Vietnam War and earlier conflicts such as the Korean War, that made this heavy repair capability so critical in Vietnam? As a 1965 Air Training Command historian explains:

> What was missing from the Air Force's resources was the wherewithal to quickly restore runways and maintenance areas or, if need be, to provide 'expeditionary' airfields in pioneer environments.
>
> A logical question, of course, was how the Air Force managed in Korea but could not in Vietnam; surely the problem had occurred there, too. The answer lay both in the degree of commitment and the restraining legalities--measured response--the American system applied to the force-aspect of foreign relations. The United States' involvement in Korea was on a larger scale, but more significant to the question was the fact that it was accompanied by a proclamation of a State of National Emergency [15:345].

The declaration of a state of emergency in Korea obligated the Army to commit to construction support for the Air Force. In contrast, the American involvement in the war in Vietnam began with an Executive Order from the President, '. . .hence the gap in Air Force resources.' The Army was

not obligated to such a commitment of resources under an Executive Order. This lack of support caused a shortage in heavy repair and troop labor construction capabilities normally provided by Army engineers (15:345).

What resources did the Air Force have, either in-house or available through another service? The host Base Civil Engineering unit and the Prime BEEF personnel who were assigned on a short TDY basis could perform normal base operations and maintenance (O&M) functions and could repair light damage resulting from enemy attack. But the Army was responsible for providing heavy repair support, as well as troop construction support when it was possible to do so. Thus, when the Army refused to work for the Air Force for whatever reason, the Air Force faced a shortage in capability.

The Army did have four engineer units in Vietnam, as shown in Table 3.

Table 3
U.S. Army Engineer Units in Vietnam (13:80)

Unit	Deployed Location
35th Engineer Group	Cam Ranh Bay
62nd Engr Const Battalion	Phan Rang
18th Engr Brigade	Saigon
Engr Const Battalion	Qui Nhon

However, in order to get Army troop construction support, USAF had to route their request vertically through the USAF component chain of command to MACV, who then routed the

request down the Army chain of command where the request was evaluated; the request was weighed against Army requirements, because the Army engineers had requirements from their own units in Vietnam. Logically, this process took a much longer period of time than it would have if USAF had an organic construction capability.

There were times when the Army simply could not respond, either because they lacked the manpower or time to respond to the Air Force's needs. The capability that the Air Force needed from the Army included the construction of an expeditionary airfield and a 1000-man austere cantonement area. Construction of an 'expeditionary' airfield, semantically, did not conflict with prior prohibitions against constructing 'expedient' airfields, which would duplicate Army capabilities (32:all). An expeditionary airfield has better developed facilities, normally constructed of wood or metal, and provides for longer-range use (23:all).

In contrast to the Korean War, the Air Force had an alternative to using Army engineer construction support; the Navy Officer In Charge of Construction (OICC) was assigned the responsibility of contract construction management in SEA. The use of the Navy OICC for day-to-day Operations and Maintenance (O&M) construction projects became impractical for many reasons. It was tremendously expensive. Congress limited O&M construction project costs to $25,000 per project, which included materiel and labor. When a project is accomplished using military labor (such as RED HORSE

troops), that labor is not charged to the project. In most contract construction projects, labor accounts for a very large portion of the project cost. Thus, a typical O&M project exceeded the funding limit in most cases when the contractor's labor costs were added to the total project cost. Typically, a troop construction project cost nearly four times as much when accomplished through OICC (32:all).

Second, according to Gen. Mays, there was a time delay before the OICC contractor could mobilize and begin construction, whereas with organic troop labor, a construction unit could move in immediately on an emergency construction project (32:all).

Although the Air Force had not been permitted by earlier joint agreements to develop the capability to construct a runway "expedient or otherwise" (33:all), AFCE, because of General Curtin's (the Deputy Chief of Staff for Civil Engineering) prophetic vision (32:all), had already conducted a study and concluded that we needed "an inhouse quick reaction capability . . . in the formation of heavy repair squadrons adjunctive to the Prime Beef program . . ." (15:346). The Prime BEEF (Prime Base Engineer Emergency Force) program was designed to provide normal base O&M operation, light repair, and RRR capability under the control of a base commander and were rotated to South Vietnam on TDY's of 120 days. However, Prime BEEF carried very little heavy repair capability and virtually no construction

capability (11:3). That resulting gap would be filled by RED HORSE (32:all).

In 1966, a total of six RED HORSE squadrons were deployed to the Southeast Asia theater during the war as shown in Table 4.

Table 4
Initial RED HORSE Deployment to SEA (14:11,32:2)

Squadron	Location	Date
554th	Phan Rang, RVN	Feb 66
555th	Cam Rahn Bay, RVN	Feb 66
556th	U Taphao, Thailand	Sep 66
819th	Phu Cat, RVN	Aug 66
820th	Tuy Hoa, RVN*	Sep 66
823rd	Bien Hoa, RVN*	Nov 66

*Represents the main base of deployment; smaller elements were deployed from the main base to other bases such as Da Nang, Pleiku, and Tan Son Nhut (14:11), also Vung Tau, and Dong Na (32:2). A more thorough deployment history of Red Horse units in SEA, including their activation/deactivation dates and deployment locations is shown in Figure 1.

Construction in SEA

Gen. Archie Mays describes the RED HORSE experience early in the Vietnam War. RED HORSE squadrons were required to perform troop construction projects, seemingly violating all previous joint agreements. The USAF's designated contract construction agent in Southeast Asia (SEA) was the U.S. Navy's Officer in Charge of Construction (OICC).

By joint agreement, the Army was responsible for providing troop labor construction support to the Air Force

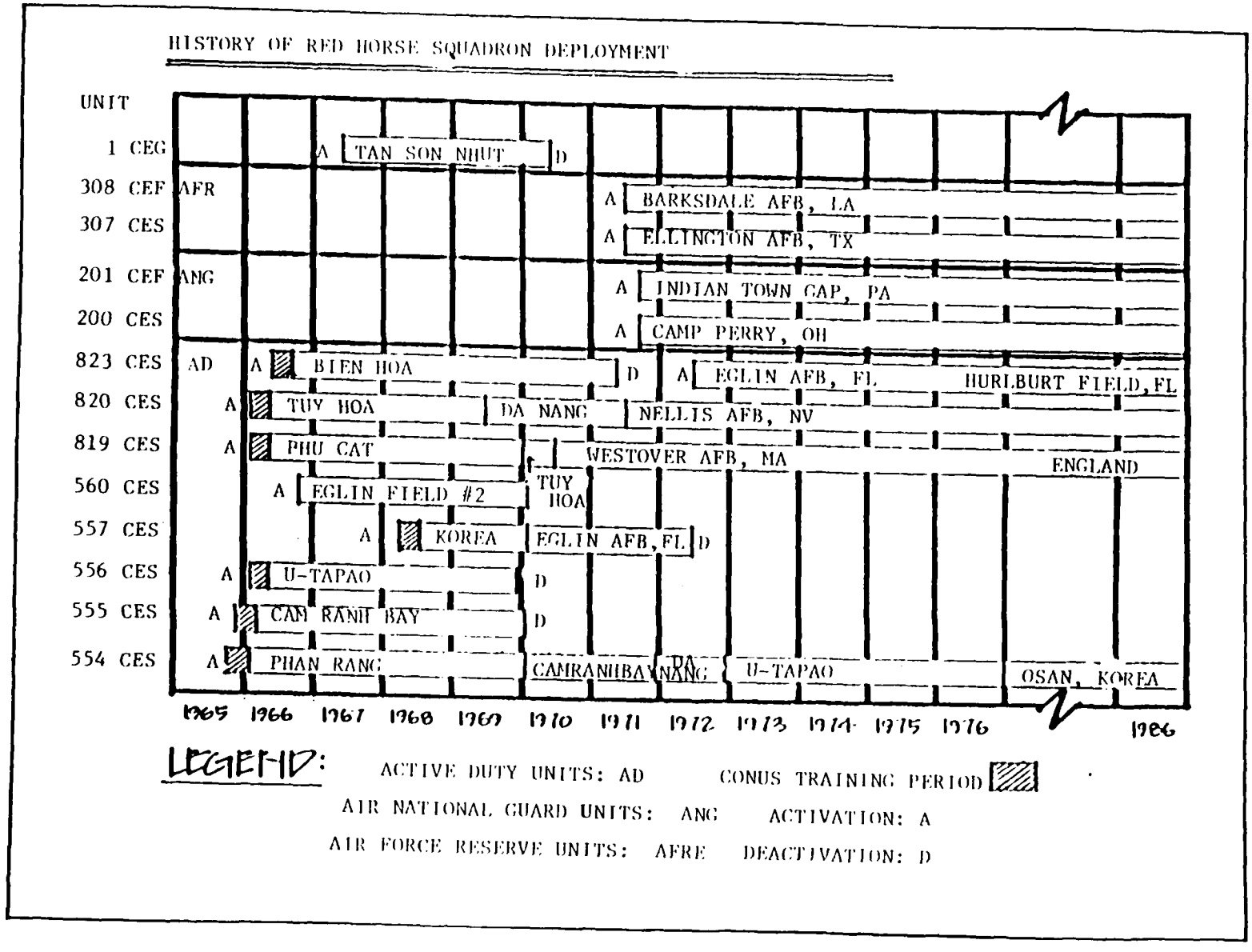

FIGURE 1: HISTORY OF RED HORSE SQUADRON DEPLOYMENT (25)

in SEA, as it had in the Korean War. During the Vietnam War, however, the Air Force could not seem to get a share of the Army engineers' or Navy Seabees' troop effort sufficient enough to satisfy the Air Force's support requirements.

Secretary of Defense McNamara asked both the Department of the Army and the Department of the Navy if they could produce more engineers to fulfill the requirement. Both departments contended that they could not produce and train more engineers at that particular time. Secretary Brown, however, said that the Air Force could. At this point, General Curtin's foresight was clear. As the USAF/DCS for Civil Engineering, he had begun to analyze the feasibility of an organic heavy repair capability within the USAF months before the issue came to the attention of the Secretary of Defense. Because of his thorough problem-solving staff work and tact, RED HORSE was officially conceived within the Department of Defense (32:11).

Gen Curtin's study stated that the problem was that the Air Force did not have the capability for heavy repair beyond normal host base engineering capability, the ability to support force deployments for contingencies other than national emergencies or war, or the capability "to provide 'expeditionary' airfields and austere facilities in combat areas. . . pending the assignment of construction troop support by either the Army or Navy" (7:1).

One of the main factors of the problem is the lead time needed to obtain the required support from the unified

(theater) commander, or to wait for the deployment of troop units in the CONUS, which requires some 150 to 180 days (7:2).

The report discusses the minimum requirements for proper support of Air Force deployments, recommends personnel makeup for the proposed heavy repair units, the special training requirements, deployment status, and operational control while deployed (7:all).

Finally, the contractor 'combine' itself could not sufficiently support the Air Force's requirements in SEA. The combine, so called because of the combination of contractors, was Raymond, Morris-Knudsen, or RMK (13:3). The tremendous buildup of forces from all military services so swamped RMK, the Army engineers, and the Navy Seabees with construction requirements that the Air Force's share of the construction effort was much too small (32:all). Indeed, USAF's share of the contractor effort was less than half of that required to keep up with the JCS's deployment schedule to SEA (8:36).

In fiscal years 1965 and 1966, the construction program for combined U.S. forces had rapidly grown to over 2000 construction line items. This increase overtaxed the Navy's construction contractors' capabilities, and BUDOCKS (Bureau of Yards and Docks) added the Brown and Root and J. A. Jones construction companies to the existing RMK combine to help relieve some of the overload (13:14-15). Meanwhile, the Army engineers were also inundated with requirements for

road and bridge construction, and the Navy Seabees were likewise overrun with requirements for port construction (17:all).

Fiscal year (FY) 1966 saw one of the largest construction programs carried out by U.S. forces in South Vietnam. Principal requirements in that year included:

Table 5
FY 66 Construction Program for SEA (19:40)

8 jet fighter bases
6 new deep water ports
26 hospitals with 8280 beds
280,000 kilowatts of electric power
10,400,000 square feet of warehousing
3,100,000 barrels of POL (Petroleum, Oil, and Lubricant) storage
5,460,000 square feet of ammunition storage
75 new C-130 cargo aircraft airfields
$27,100,000 of communications facilities
39,000,000 cubic meters of dredging
4,100 kilometers of highways
434,000 acres of land clearing
182 water wells

The basic issue of the division of Service responsibilities had again caused AFCE problems in meeting USAF mission requirements. The problems were manifest in terms of both timeliness and cost of support in Vietnam. Army support, when available to USAF, required time to relay the request up and down the appropriate chains of command. Navy contractor support, when available, required even more time because of mobilization time required by the contractor combine. In both cases, Army and Navy contractor support

was available only if other Army and Navy requirements allowed.

RED HORSE Construction in Vietnam

It soon became evident that if the Air Force was to get construction done on time to support the USAF buildup in SEA, they would have to do it themselves. In 1967, at Phan Rang AB, the 554th HR Squadron became the first RED HORSE unit to be employed in 'construction' efforts in Vietnam at Phan Rang AB, RVN. A 1967 USAF historian's report points out that this was a response to 'dire necessity':

> This utilization of the Heavy Repair outfits was not made in deliberate disregard of USAF policy expressed in a CSAF's 29 November letter but as a matter of dire necessity and at the request and with the consent of MACV and all other agencies concerned [19:104].

Col Henry Stehling summarized the problems that led to this first use of RED HORSE:

> When the chips are down, required construction often exceeds the capability of available construction forces. Regardless of agreements on roles and missions and designations of construction agents, the possibility exists that the Air Force will find itself in the construction business. Theater commanders have directed Red Horse squadrons to accomplish MCP projects due to the lack of contractor or Army Engineer forces. Acting on PACAF's recommendation, the Air Force was designated by DoD the construction agent on the Turn Key base in Vietnam [39:9].

As Col Stehling points out, another early example of a RED HORSE unit used in the construction mode was in a program called Operation Turnkey, managed entirely by the Air Force at Tuy Hoa AB, RVN. The Air Force could not acquire the level of construction effort necessary from OICC,

or from Army or Navy troop labor. The Air Force, as agreed, had first requested contract effort through OICC, and troop labor effort through the Army and Navy, but when those sources failed to produce the desired results, Military Assistance Command, Vietnam (MACV), 13th Air Division, and Secretary McNamara approved the employment of a contractor, who was not a part of the RMK-BRJ combine under the Navy's OICC. This contractor, Walter Kidde, Constructors, Inc, was employed to construct a complete airfield and port facility at Tuy Hoa, under USAF contract administration. The USAF called on RED HORSE to assist Walter Kidde. RED HORSE, in the end, was responsible for about 50% of the construction at Tuy Hoa (23:18).

Following the success of RED HORSE at Tuy Hoa, the 554th HR, located at Phan Rang, was employed to purchase building materials through OICC and construct troop housing, under a directive from Military Assistance Command, Vietnam-Director of Construction, or MACV-DC, otherwise known as MACDIC (4:2). Table 6 shows the tempo of RED HORSE construction performed in SEA by the end of 1967.

Table 6
RED HORSE Construction Achievements Through 1967
(17:100-114,24:19-24)

Unit	Location	Achievement
554th	Phan Rang AB	10,000 FT runway rebuilt 10,000 FT taxiway rebuilt 67 dormitories built
555th	Cam Ranh Bay AB	640,000 SF vertical const 650,000 SY of earthwork 25,000 LF utility lines
819th	Phu Cat AB	1,300,000 CY of earthwork 11,400 CY of concrete work 553,000 SF vertical const
820th	Tuy Hoa AB	360,000 SF airfield mat 5 mi roadway POL tankfarm & dist system Ammo storage area 400 man dining hall 1400 man billeting facility
823rd	Bien Hoa AB	108,000 SF vertical const 133,500 SY horizontal const 12,000 LF revetment/fence
	Ton San Nhut AB	communications center revetments other miscellaneous work
	Vung Tau AB	44,000 SF vertical const
	Da Nang AB	85,000 SF vertical const 5,000 LF revetment/fence
	Pleiku AB	74,000 SF vertical const 5,000 SY horizontal const 4,200 LF revetment

Definitions: FT-feet; SF-square feet; LF-linear feet; CY-cubic yards; dist-distribution.

Airbase Security Responsibility Evolution

In April 1965, President Johnson expanded the U. S. Forces' mission offensively. With that mission change,

troops, which before were dedicated to airbase defense and security, were now released for offensive operations, placing USAF airbase security in doubt.

Another critical area that RED HORSE was engaged in was airbase security and defense facility construction, especially in the 10 major U.S. airbases: Da Nang, Phu Cat, Tuy Hoa, Nha Trang, Cam Ranh Bay, Phan Rang, Pleiku, Tan Son Nhut, Bien Hoa, and Binh Thuy (36:55). Airbase security responsibility changed hands quite rapidly during early U.S. involvement in SEA, and caused USAF much concern because they were not always sure whose responsibility it was. Until March, 1965, defense of U.S. installations, personnel, and equipment had been a Vietnamese responsibility. However, because of such incidents as the October attack on Bien Hoa and the Christmas Eve bombing of the Saigon Officers' Club in 1964, elements of the 9th Marine Expeditionary Brigade landed at Da Nang to

> occupy and defend critical terrain features in order to secure the airfield and, as directed, communications facilities, U.S. supporting installations, port facilities, landing beaches, and other U.S. installations in the area against attack [36:20].

Surprisingly, they were not to engage the Viet Cong in any day-to-day actions. Similarly, the 173rd Airborne Brigade deployed to Bien Hoa and Vung Tau airbases for security duties, at about the same time. Following Secretary McNamara's visit to the Republic of Vietnam (RVN) in late 1964, he requested that 68 more infantry battalions be sent to RVN in 1965 and 1966, of which 21 were to be security

forces. The Air Force, therefore, expected its security requirements to be filled, but in April 1965, President Johnson expanded the U.S. forces' mission offensively. USAF airbase security became in doubt because of this mission change; troops dedicated for airbase defense were now strictly offensive troops, leaving USAF airbase security requirements to be filled by USAF resources, which were not yet identified (36:25).

In late 1965, the Air Force recognized that because of the mission changes of the ground combat troops in RVN, the Air Force would have to provide for its own ground security. USAF Security Police ground defense forces were formed and employed to meet the threat (36:78-80). AFCE supported their facility and defensive fortification requirements using RED HORSE troops (36:70,154).

President Nixon's Vietnamization Program created more problems in defense and security facility construction in RVN, and thus impacted RED HORSE materiel and manpower requirements. Because the U.S. was turning the war back over to the South Vietnamese, the Secretary of Defense halted funding of such defensive facilities, as perimeter fencing at Phu Cat, and perimeter lighting at all airbases in Vietnam (36:68). The wisdom of not funding these relatively simple, inexpensive projects seems doubtful when the cost of one aircraft (lost as a result of ground attacks) would have funded enough fence and lights for all USAF airbases in RVN . In the meantime, USAF Security Police

were building expedient bunkers and positions with RED HORSE assistance in heavy equipment operations and material and supply requisition (36:66).

Through all the problems encountered by AFCE in the Republic of Vietnam, RED HORSE was there to help support the mission. As stated by a senior Air Force staff officer, after visiting Vietnam, '. . .the RED HORSE squadrons can do anything and are doing everything. . .' (5:1).

The Future

What does this bode for RED HORSE squadrons and their effectiveness in future conflicts?

A comparison of AFR 85-25, the enabling RED HORSE regulation from 1967, and AFR 93-9, the 1983 edition regulating RED HORSE, shows no significant changes to RED HORSE. The number of RED HORSE personnel in a squadron remains at approximately 400, with the same career specialties of civil engineering, logistical, maintenance, services, and medical sections. The major training requirements remain the same, with the newer regulation merely stating specific requirements. Above all, the operational control of RED HORSE squadrons in a contingency remains centralized under the major command in peacetime and the USAF theater commander during wartime (10:all,16:all).

According to BGen (Ret) Mays, there is a logical reason why RED HORSE has had no major reorganization since its creation; it has essentially the same size, composition, and capabilities today as it had in Vietnam. He contends that

> If the organization has not changed significantly, I would have to assume that is because it worked so well. . . . I don't see the need for organizational change unless this is needed because of new technology or new equipment developments [31:2].

Other people see the need for change. Col Glaze suggests "a mix of light and heavy squadrons be created (27:3). A heavy squadron, with its full complement of heavy equipment, would be prepositioned in its assigned theater of intended operations, such as the 554th HR in Korea. A light squadron should be developed with its equipment reconfigured for rapid, airmobile transportability within the theater (25:3). These light squadrons could be based in CONUS, and air transported to the theater of operations in times of emergency. Although Col Glaze's suggestion seems radical, it only increases RED HORSE's flexibility for future wartime deployment and employment, and does not change the basic function or type of support of RED HORSE.

This suggestion does not necessarily represent a major organizational change in RED HORSE for several reasons. First, the heavy, prepositioned squadrons are not targeted for change. Second, the light squadrons are meant as an added dimension in deployment and employment flexibility. Finally, the critical issue of centralized control of RED HORSE operations would be maintained. For these reasons, Col Glaze's suggestion seems to enhance the value of RED HORSE in the contingency environment.

Flexibility is the key to effective AFCE support of the Air Force mission. The value of RED HORSE support in future conflict depends on the emphasis our AFCE leadership places on the evolution of AFCE flexibility, and especially that of RED HORSE. Only in this way can we keep our AFCE warfighting elements on the cutting edge of readiness (25:3).

V. Summary, Conclusions, and Recommendations

The previous three chapters of this thesis summarize events of a twenty-year period, from which the answers to research questions in Chapter 1 are now pieced together. This final chapter presents my conclusions about the effectiveness of RED HORSE, and recommendations for future research in AFCE warfighting history.

Research Summary and Answers

Research Question #1: What was the AFCE issue during the Vietnam era that influenced the decision to organize the RED HORSE unit?

One major issue precipitated the formation of RED HORSE. The issue grew out of the original division of responsibilities between the Army and the Air Force: Who should provide heavy repair and construction support for the Air Force? The responsibilities were established by joint agreements from the National Security Act of 1947; it demanded inter-service coordination during war. In Korea, the required coordination was poorly done because of the poor SCARWAF unit manning rates, personnel experience, and the lack of crucial Air Force oriented training for SCARWAF troops. In Vietnam, AFCE leaders had to route construction requests through the Air Force, MACV, Army, and OICC chains of command, which introduced unacceptable time delays into the system.

In actual practice, the problems with each source of

construction support proved intolerable to the AFCE leaders. The Navy OICC contractor combine in Vietnam proved too expensive as well as too slow. The Army engineers and Navy Seabees were too busy supporting their own services' requirements to sufficiently support the Air Force's needs. At the first appropriate opportunity, therefore, AFCE staff recommended to the USAF and DoD leaders the creation of RED HORSE.

As General Archie Mays said, 'It just is not practical to depend 100% on someone else when they have their own thing to do' (31:2).

Research Question #2: How did the issue differ from the issue of previous conflicts?

The nature of the Vietnam War differed from that of the Korean War mainly in our mode of involvement. The Korean War began with a declaration of a state of emergency, which obligated the Army to commit resources in the form of SCARWAF units under direct Air Force operational control, for construction support to the Air Force. The Army had no such obligation in the Vietnam War because it began with an executive order from the President. This meant that the Air Force was not in a position to coerce an automatic fair share of support from the Army or Navy in Vietnam, but had to request support from the those services, and had to find 'work-arounds,' in the form of base civil engineers and Prime BEEF teams, when the other services could not support their requests, or at least not in the time requested.

Research Question #3: Is the Red Horse organization still a viable AFCE asset for future conflict?

RED HORSE has several characteristics which make it attractive for AFCE support in wartime: flexiblity in organization, currently pre-positioned squadrons in Asia and Europe, air transportable equipment (with few exceptions), and more extensive training than other AFCE units. A RED HORSE squadron, because of its three-echelon arrangement, lends itself readily toward any number of deployment configurations, from full unit mobilization to several different combinations of echelon profiles.

Another positive feature within AFCE is that there are full RED HORSE squadrons currently pre-positioned at Osan AB and Kunsan AB, South Korea, and RAF Weathersfield, United Kingdom. This gives USAF component commanders in the U.S. Pacific Command and U.S. European Command an added dimension in deployment flexibility for AFCE support much earlier in a wartime or contingency situation.

With the exception of certain pieces of equipment in the RH-3 echelon, such as the 18 CY scrapers and the concrete batch plants, a RED HORSE unit is readily air transportable. This provides for rapid deployment of RED HORSE assets in time-critical situations.

Finally, RED HORSE units receive more intensive training in wartime skills than do other AFCE units because Red Horse units specifically train on projects which closely relate to the wartime mission. A broader range of training given RED HORSE members includes explosive demolitions,

mineral plant operations, well drilling, and special weapons training on such weapons as the M-60 machine gun and the 40-mm grenade launcher, all of which are unique to RED HORSE, within the AFCE field.

AFCE leaders should plan to use RED HORSE assets in future contingencies, but their planning should also include creative thinking of ways to increase RED HORSE's flexibility of deployment and employment.

Conclusions

This research yielded a number of conclusions, some of which are aimed at the highest levels of AFCE and even the Department of Defense, while others should be considered by planners and 'thinkers' at the Air Force Engineering and Services Center, the Engineering and Services School of AFIT, and even individual unit commanders.

First, problems in Korea and Vietnam clearly established that the delegation of responsibilities for troop construction and contract construction management did not work well. In Vietnam, in particular, RED HORSE favorably showcased the Air Force's capabilities for organic troop construction, and specifically at Tuy Hoa, among other places, proved our capability to manage contract construction.

Second, RED HORSE is an effective long-range operational unit. The design of the RED HORSE squadron includes mode of transportation, flexibility of deployment and em-

ployment, breadth of capability, and sustainability and permanence outside of normal base support.

Third, RED HORSE should be reviewed from the standpoint of improving its deployment mobility. In the least, an RH-1 echelon, and possibly an RH-2 echelon should be configured or even re-equipped to be airmobile, if not air-droppable, for especially time-critical operations.

Recommendations for Further Research

Time and budget constraints for AFIT research prevented TDY visits to, and other communications attempts with, many potential information sources. My recommendations for further research represent smaller tasks of a more specific research effort.

First, histories of specific RED HORSE units could yield specific accomplishments and projects which demonstrate problem-solving techniques, innovative leadership, and creative decision making methods. This information needs to be assimilated and, after analysis, institutionalized into the junior ranks of AFCE leadership. Individual squadron histories, properly summarized and written, can provide a valuable source for unit esprit, as well as another source for Project Warrior training.

Second, major command histories should be researched for pertinent information. Not only should civil engineering-specific records be researched, but also records, correspondence, and histories from overall command and staff functions.

Third, a comprehensive list of RED HORSE personnel is needed. This list ideally should name personnel involved in critical contingency environments--Vietnam as well as major exercises and deployments.

Fourth, research into the use of RED HORSE in future contingencies is needed. Specifically, researchers should look at the transportation requirements, i.e., how many aircraft are required to transport each RED HORSE echelon? what type(s)? and what are the aircraft resources and their probabilities of availability during a crisis (both inter- and intra-theater)? Another area for future RED HORSE mobility requirements which needs research is the possibility of multi-skilled team members, smaller, multi-purpose equipment which is air transportable in C-130 aircraft or possibly 'slung' under heavy cargo helicopters. Can they deploy by C-130, or will they need to fly into an area by helicopter or airdrop? If the mission requires the exotic forms of mobilization, are they trained for it? Will they require multi-skilled personnel to reduce the team size for a specific mission?

RED HORSE was created to provide desperately needed AFCE capability. It performed all that was required, and then some, in a totally professional, dedicated, and extremely admirable manner. It has, since its origin, continued in that same fashion for over 20 years, and from my research, I see no reason for that to change.

'Can Do--Will Do' is an appropriate motto.

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ABSTRACT

The purpose of this study was to analyze the historical events leading up to the creation of RED HORSE (Rapid Engineer Deployable, Heavy Operation Repair Squadron, Engineering). The study had two objectives: (1) Capture the decision making rationale for the creation of RED HORSE by summarizing Air Force Civil Engineering's historical situations, problems, and solutions, in past wars, since WWII. (2) Provide a historical perspective of the decision making processes within the Air Force Civil Engineering community since its existence, with a focus on RED HORSE.

The three historical periods which bear most heavily on RED HORSE are the period following WWII in which the joint Army and Air Force agreements of the National Security Act of 1947 divided the responsibilities for contract construction and troop labor construction between the Army and the Air Force, the Korean War, during which Army SCARWAF units supplied the Air Force with construction support, and the Vietnam War, which precipitated the creation of RED HORSE due to the lack of construction support from the Army and Navy.

The research methodology included (1) personal correspondence conducted with two AFCE leaders who were heavily involved in the creation of RED HORSE and were former commanders of RED HORSE units during their Air Force careers, (2) review of such journals as The Air Force Engineering and Services Quarterly, Air University Review, The Civil Engineer, and The Military Engineer, and various theses and papers written at the Air Force Institute of Technology, Air War College, and Air Command and Staff College, and (3) research at the Air Force Historical Research Center, Maxwell AFB AL.

The study concludes that due to the lack of sufficient support from sister services during past conflicts, after WWII, the Air Force sought for, and was granted, organic troop construction and contract construction management capability in the form of RED HORSE.